



## SECTION 1019

### CEMENT

**1019.1 Scope.** These specifications cover portland cement, Type IP portland-pozzolan cement, Type I(PM) pozzolan modified portland cement, Type IS portland blast-furnace slag cement and Type I(SM) slag-modified portland cement.

**1019.2 General.** All portland cement shall conform to the requirements of AASHTO M 85.

**1019.2.1** All blended hydraulic cement shall conform to the requirements for Type IP, I(PM), IS or I(SM) of AASHTO M 240 with the following modifications.

(a) Type IP or I(PM) cement shall be produced by intergrinding portland-cement clinker and pozzolan or may be produced by blending portland cement and pozzolan provided approved analytical procedures are provided.

(b) The pozzolan constituent of Type IP shall not exceed 20 percent by weight (mass) of the total portland-pozzolan cement.

(c) Type IS or I(SM) cement shall be produced by intergrinding portland cement clinker and granulated blast-furnace slag or may be produced by blending portland cement and ground granulated blast furnace slag provided approved analytical procedures are provided.

(d) The slag constituent of Type IS or I(SM) shall not exceed 25 percent by weight (mass) of the total portland-slag cement.

(e) The basis of acceptance shall be as described in [Sec 1019.3](#) in addition to AASHTO M 240.

**1019.2.2** Types I, II, IP, I(PM), IS or I(SM) cement shall be used for all general concrete construction except as herein specified or where other types of cement are permitted. If Type I is specified, Types II, IP, I(PM), IS, and I(SM) will be allowed, subject to any requirements for each type, unless otherwise specifically prohibited. Types IP, I(PM), IS or I(SM) shall not be used in concrete designed for high early strength. Type I or Type III portland cement shall be used in high early strength concrete. Type III portland cement may be used in any precast concrete. White portland cement shall meet the requirements for Type I. Type IA, air-entraining portland cement, shall be used only when specified in the contract. Different types of cement shall not be mixed nor shall different types be used in the same unit of construction.

**1019.2.3** A sack or bag of cement is considered to be 94 pounds (42.6 kg) net.

**1019.3 Sampling, Testing and Acceptance Procedures.** All manufacturers and terminals furnishing cement to MoDOT projects shall be qualified as herein described. All cement shall be subject to inspection and sampling by MoDOT at the source of manufacture, an intermediate shipping terminal or destination. MoDOT shall be allowed free access to all facilities and records as required to conduct inspection and sampling.

**1019.3.1 Manufacturer Qualification.** In order to become qualified, a written request shall be sent by the manufacturer to the Division Engineer, Materials, along with a copy of their QC plan and the following information. In order to maintain qualification, the manufacturer shall submit additional information, as listed, to MoDOT. The plant may be inspected to verify the information and to establish personal contact with the QC personnel.

**1019.3.1.1** The following information shall be included in the request for qualification.

(a) An outline of the QC program from the quarry to the point where the product is relinquished to the purchaser. The QC program shall cover all tests required by the specification and include the testing frequency for each test.

(b) A copy of the most recent Cement and Concrete Reference Laboratory (CCRL) inspection report and the latest CCRL proficiency sample report. The CCRL inspection shall cover all tests required by the specification. Documentation showing satisfactory resolution of all inspection deficiencies shall be included.

(c) The physical layout of the plant, including the number and capacity of finish mills and silos and the type of cement stored in each silo.

(d) If blended IP, I(PM), IS or I(SM) cement is furnished, the following is also required. The layout of the blending system, from the portland cement and pozzolan or slag silos to the point where the blended product is relinquished to the purchaser, shall be furnished along with the request for qualification. The supplier shall describe and have in place an analytical procedure that can be shown to be of sufficient accuracy to determine the pozzolan or slag content of the blend to within  $\pm 1.0$  percent of the true pozzolan or slag content. The analytical procedure, frequency of sampling and testing locations are subject to approval by MoDOT.

(e) A copy of a typical bill of lading with the required certification statement.

(f) A split sample of each type of cement proposed for use. Manufacturer test results for the split sample shall also be submitted.

**1019.3.1.2** In order to maintain qualification, the following is required.

(a) Monthly QC test results covering the production of cement types proposed for use in MoDOT projects, including the high, low and average results for each type shall be forwarded to MoDOT, no later than two weeks following the end of the period covered by the report.

(b) A copy of the most recent CCRL inspection and proficiency sample reports and any deficiency resolutions shall be forwarded promptly to MoDOT.

(c) If blended IP, I(PM), IS or I(SM) cement is furnished, a target value for the percentage of pozzolan or slag in the blend shall be provided to MoDOT, and test results from the manufacturer shall not vary more than two percentage points from the target value. MoDOT shall be informed, in writing, prior to changing the target value. At no time shall the test results show a percentage of pozzolan in the blended IP or I(PM) greater than 20 percent or a percentage of slag in the blended IS or I(SM) greater than 25 percent.

(d) Quarterly split samples for each type of approved cement will be obtained by MoDOT for joint testing by the manufacturer. Manufacturer test results on the split samples shall be furnished to MoDOT when completed.

(e) All QC test results shall be available for a minimum of three years, for MoDOT review upon request.

(f) No cement out of specification shall be allowed into a silo destined for MoDOT projects.

**1019.3.2 Terminal Qualification.** In order to become a qualified terminal, a written request shall be sent from terminal personnel to the Division Engineer, Materials. The request shall be accompanied by a letter from each affected and qualified manufacturer, advising of the intent to ship through the respective terminal. Any changes in cement source shall be updated in the same manner. Terminals will be inspected to ensure adequacy to accept, retain and ship cement from qualified manufacturers.

**1019.3.3 Failure to Comply.** Failure to fulfill any of these requirements may result in disqualification of the cement manufacturer or a terminal. If a manufacturer is disqualified, all terminal shipped cement originating from that manufacturer will automatically and immediately be disqualified also. If a terminal is disqualified, all cement shipped from that terminal may be disqualified until the issue is resolved, regardless of the manufacturer. In cases of dispute, test results obtained by MoDOT will be considered referee and final.

**1019.3.4 Disqualified Manufacturers.** If a manufacturer has been disqualified, they will be required to designate the silo, bin or storage facility from which they propose to furnish cement for MoDOT projects. Each silo, bin or storage facility designated must be sampled, tested, sealed and approved by MoDOT prior to shipment. The manufacturer shall also sample, test and report the test results for each designated silo, bin or storage facility. This procedure will continue until adequate QC has been established.

**1019.3.5 Foreign Cement.** All tests on foreign cement shall be performed by a qualified domestic manufacturer.

**1019.4 Acceptance.** It shall be the responsibility of the supplier to guarantee by certification the material complies with the specification requirements. When a qualified manufacturer or terminal is shipping cement for, or purchasing cement from, another qualified manufacturer, the bill of lading or delivery receipt shall be from the shipping company. The certification statement showing the actual manufacturer shall be prominently placed on the bill of lading or delivery receipt. A copy of the bill of lading or delivery receipt shall accompany each shipment and shall be furnished to MoDOT at the shipping and destination points.

**1019.4.1** The bill of lading or delivery receipt for each shipment to MoDOT projects shall carry the following certification statement:

"This is to certify this Type \_\_\_\_ cement originated from a MoDOT qualified manufacturer, has been maintained to meet MoDOT specifications and was loaded from silo number \_\_\_\_."

\_\_\_\_\_  
Name and Location of Manufacturer

\_\_\_\_\_  
Name and Location of Shipping Facility

By\_\_\_\_\_  
Signature and Name of Marketing Entity